

What is claimed is:

1. An apparatus for reducing orbital motion during Czochralski crystal growth in a crystal pulling machine comprising:
 - a bottom chamber;
 - a crucible within the bottom chamber, the crucible rotatable around an axial axis and containing a molten material;
 - a top chamber above the bottom chamber;
 - a winding drum mounted on the top chamber, the winding drum rotatable around the axial axis;
 - a flexible member wound around the winding drum and extending downward along the axial axis into the pull chambers; the flexible member supporting and pulling a crystal from the molten material;
 - a controller; and
 - at least one active damping module.
2. The apparatus of Claim 1, wherein the flexible member is a wire.
3. The apparatus of Claim 1, wherein the flexible member is a cable.
4. The apparatus of Claim 1, wherein the at least active damping module comprises a wire interceptor, a spring, and a control loop dampener.

5. The apparatus of Claim 4, wherein the control loop dampener is adjusted by the controller.
6. The apparatus of Claim 5, wherein the control loop dampener is gas-driven.
7. The apparatus of Claim 5, wherein the control loop dampener is hydraulic.
8. An apparatus for reducing orbital motion during Czochralski crystal growth in a crystal pulling machine, comprising:
 - at least one active damping module for intercepting a pull wire, the pull wire having pendular motion; and
 - a controller, wherein the controller calculates the natural frequency of vibration for the growing crystal and adjusts the at least one active damping module to provide critical dampening.
9. The apparatus of Claim 8, wherein the active dampening module comprises a wire interceptor, a spring, and a control loop dampener.
10. The apparatus of Claim 9, wherein the control loop dampener is gas-driven.
11. The apparatus of Claim 9, wherein the control loop dampener is hydraulic.
12. An apparatus for reducing orbital motion during Czochralski crystal growth in a crystal pulling machine, comprising:

a means for intercepting a pull wire, the pull wire moving in a pendular motion;
a means for critically damping the pull wire; and
a means for calculating the natural frequency of vibration of the pull wire and
maintaining the critically damping means in a critically damping state throughout crystal
growth.